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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/643,946	08/23/2000	Kevin J. Torek	M4065.0166/P166-A	2940

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EXAMINER
VINH, LAN

ART UNIT	PAPER NUMBER
1765	17

DATE MAILED: 06/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/643,946	Applicant(s) TOREK ET AL.	
	Examiner LAN VINH	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 April 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *142,144,146-148,150-152,154-156 and 158* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *158* is/are allowed.

6)☒ Claim(s) *142,144,146-148,150-152 and 154-156* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 142, 144, 146-148 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schellenberger et al. (US 5,714,203) in view of Ward et al (US 5,988,186)

Schellenberger discloses a method for drying semiconductor substrate including the step of dipping the substrate in a cleaning solution. This solution comprises of:

hydrofluoric acid (HF), which reads on a fluorine source (col 3, lines 55-56)

acids such as hydrochloric acid (HCl), phosphoric acid (H_3PO_4), which reads on a complimentary acid (col 3, lines 58-59)

alcohol/solvent (col 3, lines 56-57)

an organic acid (citric acid) (col 3, lines 57-58), which reads on a surface passivation agent especially since an organic acid such as citric acid is defined as a surface passivation agent in page 6 of the specification.

Unlike the instant claimed inventions as per claim 142, Schellenberger does not specifically disclose using tetrahydrofuran /a non-aqueous solvent/ alcohol in the cleaning solution although Schellenberger does discloses using alcohol in the cleaning solution.

However, Ward discloses using a stripping and cleaning solution includes acid and tetrahydrofuran to clean silicon wafer (col 4, lines 33-44)

Since both Schellenberger and Ward are concerned with method of cleaning semiconductor wafer, one skilled in the art would have found it obvious to modify Schellenberger 's cleaning solution by using tetrahydrofuran in the solution in view of Ward teaching because Schellenberger suggests that alcohol/solvent up to 80% weight can be used in the cleaning solution and Ward teaches that tetrahydrofuran is a polar solvent which can be used in the cleaning solution (col 4, lines 39-46)

For the purpose of examination, the language of " said fluorine.....in concentration suitable for the selective removal of said residue relative to any exposed metal on said semiconductor substrate", as best understood by the examiner, implies that the claimed conditioning solution contains the claimed elements in a defined concentration (page 10 of the specification) to remove the residue. Since Schellenberger as modified by Ward discloses using a cleaning solution contains the same claimed chemicals (HF acid, phosphoric acid, citric acid and tetrahydrofuran having the same concentration as the claimed cleaning solution, it would have been obvious that Schellenberger's modified cleaning solution would have performed the same function (for the selective removal of said residue relative to any exposed metal on said semiconductor substrate) as the claimed cleaning solution.

In addition, the examiner notes that the language of "for the selective removal of said residue relative to any exposed metal on said semiconductor substrate" is a recitation of the intended use of the claimed invention. A recitation of the intended use

of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure/composition is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Regarding claim 144 since the cleaning solution of Schellenberger contains the same passivation agent (citric acid) as the claimed cleaning solution, it would have been obvious that Schellenberger's citric acid/passivating agent would have performed the same function (contributes to the selective removal by the cleaning solution by passivating any exposed metal on the semiconductor substrate) as the claimed cleaning solution.

Regarding claims 146-147, it is noted in page 14 of the specification, the applicants defines that the low pH of the conditioning solution tends to allow HF present in the solution to exists as molecular HF. Since Schellenberger discloses that his solution having a pH value of less than 7 (col 3, lines 17-18), it is obvious that the HF in Schellenberger solution remaining in molecular form and contributes to the selective removal of the cleaning solution.

Regarding claim 148, it is noted in page 11 of the specification, the applicants defines that the sufficient concentration of the claimed elements in the cleaning solution as (0.01%-5.0% HF, 80-99% alcohol, 0.003-1.0% complimentary acid, 0.001-1.0% of citric acid) to suppress the solubility of aluminum fluoride. Since Schellenberger and

Ward solution contains the same elements having the concentration of (0-50% acids, 0-80% alcohol), which reads on the claimed concentration, it would be obvious that Schellenberger and Ward solution concentration would have suppressed the solubility of aluminum fluoride.

3. Claims 150-152, 154-156 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schellenberger et al. (US 5,714,203) in view of Ward et al (US 5,988,186) and further in view of Small et al (US 6,248,704)

Schellenberger discloses a method for drying semiconductor substrate including the step of dipping the substrate in a cleaning solution. This solution comprises of:

hydrofluoric acid (HF), which reads on a fluorine source (col 3, lines 55-56)

acids such as hydrochloric acid (HCl), phosphoric acid (H_3PO_4), which reads on a complimentary acid (col 3, lines 58-59)

alcohol/solvent (col 3, lines 56-57)

an organic acid (citric acid) (col 3, lines 57-58), which reads on a surface passivation agent especially since an organic acid such as citric acid is defined as a surface passivation agent in page 6 of the specification.

Unlike the instant claimed inventions as per claim 150, Schellenberger does not specifically disclose using tetrahydrofuran /a non-aqueous solvent/ alcohol) in the cleaning solution although Schellenberger does discloses using alcohol in the cleaning solution.

However, Ward discloses using a stripping and cleaning solution includes acid and tetrahydrofuran to clean silicon wafer (col 4, lines 33-44)

Since both Schellenberger and Ward are concerned with method of cleaning semiconductor wafer, one skilled in the art would have found it obvious to modify Schellenberger 's cleaning solution by using tetrahydrofuran in the solution in view of Ward teaching because Schellenberger suggests that alcohol/solvent up to 80% weight can be used in the cleaning solution and Ward teaches that tetrahydrofuran is a polar solvent which can be used in the cleaning solution (col 4, lines 39-46)

Schellenberger and Ward differs from the instant claimed invention as per claim 150 by using a surface passivation agent of citric acid instead of ascorbic acid

However, Small, in a composition for cleaning organic etched residue, teaches that organic acids such as citric acid, ascorbic acid can be used in a semiconductor cleaning composition (col 6, lines 65-67; col 7, lines 1-3)

Hence, one skilled in the art would have found it obvious to substitute Schellenberger and Ward surface passivation agent of citric acid with ascorbic acid in view of Small teaching because both acids are known acid used in cleaning solution, thus the substitution of one for the other would have produced an expected result.

Regarding claim 151, since Schellenberger's cleaning solution contains up to 80% of acohol (a known non-aqueous solvent, see prior art of record for evidence of this basis) (col 3, lines 63-64), it reads on a substantially non-aqueous solution because the claimed substantially non-aqueous solution as defined as a solution that has approximately 8-95% of alcohol in page 10 of the specification.

Regarding claim 152, since the resulting cleaning solution of Schellenberger, Ward and Small contains the same passivation agent (ascorbic acid) as the claimed cleaning solution, it would have been obvious that Schellenberger, Ward and Small ascorbic acid would have performed the same function (contributes to the selective removal by the cleaning solution by passivating any exposed metal on the semiconductor substrate) as the claimed cleaning solution.

Regarding claims 154-155, it is noted in page 14 of the specification, the applicants defines that the low pH of the conditioning solution tends to allow HF present in the solution to exists as molecular HF. Since Schellenberger discloses that his solution having a pH value of less than 7 (col 3, lines 17-18), it is obvious that the HF in Schellenberger solution remaining in molecular form and contributes to the selective removal of the cleaning solution.

Regarding claim 156, it is noted in page 11 of the specification, the applicants defines that the sufficient concentration of the claimed elements in the cleaning solution as (0.01%-5.0% HF, 80-99% alcohol, 0.003-1.0% complimentary acid, 0.001-1.0% of citric acid) to suppress the solubility of aluminum fluoride. Since Schellenberger, Ward and Small solution contains the same elements having the concentration of (0-50% acids, 0-80% alcohol), which reads on the claimed concentration, it would be obvious that Schellenberger, Ward and Small solution concentration would have suppressed the solubility of aluminum fluoride.

Allowable Subject Matter

4. Claim 158 is allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claim 158, the cited prior art of record fails to disclose a conditioning solution contains a specific weight percent of molecular HF and H_2F_2. The closest prior art of Schellenberger (col 5,714,203) disclose a cleaning/conditioning solution contains HF without suggesting adding H_2F_2 to HF.

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Jagannathan et al. (US 5,304,284) discloses that alcohols are non-aqueous solvents (col 5, lines 46-48)

Response to Arguments

6. Applicant's arguments with respect to claims 142, 144, 146-148, 150-152, 154-156 (filed on 4/21/2003) have been considered but are moot in view of the new ground(s) of rejection.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

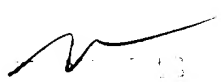
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAN VINH whose telephone number is 703 305-6302. The examiner can normally be reached on Monday-Friday 8:30 -6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, BENJAMIN L UTECH can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

LV
June 24, 2003



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